36. (Amended) The method according to Claim 35, wherein between an energy pulse of 1.5 to 15 μJ is supplied to the thermal inkjet head to expel the quantity of fluid .

REMARKS

Applicants respectfully request reconsideration of the application and allowance of Claims 22-43 (the only pending claims currently under examination) in view of the amendments and remarks made herein.

Amendments

The specification has been amended to include the Examiner requested "cross-reference to related applications" section.

Claims 22, 31 and 34 have been amended to clarify that the claims are limited to methods of depositing a nucleic acid sample fluid. Claims 33 and 36 have been amended to correct a clerical error in the originally filed claims.

Attached hereto is a marked-up version of the changes made to the specification and claims by the current amendment. The attached is captioned **"VERSION WITH MARKINGS TO SHOW CHANGES MADE"** As can be seen, no new matter has been added.

As such, entry of the above amendments is respectfully requested.

Rejections

Claims 22, 23, 26-31, 34 and 37 were rejected under the judicially created doctrine of obviousness type double patenting over Claims 1-19 of U.S. Patent No.

6,221,653. In view of the enclosed Terminal Disclaimer, this rejection may be withdrawn.

Claims 24, 25, 32, 33, 35, 36 and 39-43 were rejected under the judicially created doctrine of obviousness type double patenting over Claims 1-19 of U.S. Patent No. 6,221,653 in view of Cornell. In view of the enclosed Terminal Disclaimer, this rejection may be withdrawn.

Claims 34 to 38 were rejected under 35 U.S.C. § 112, 2nd ¶. It is believed that the above amendments to Claim 34 address the issues underlying this rejection and therefore the Examiner is requested to withdraw this rejection.

Claims 22, 23, 26, 31, 34, 37 & 38 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Deeg.

As amended, Claims 22, 23, 26, 31, 34, 37, & 38 are limited to methods of depositing nucleic acids in a manner such that the deposited nucleic acid samples. For the methods to work, e.g., in hybridization, the nucleic acids must be capable of hybridizing to their complement nucleic acids following deposition according to the subject methods.

Prior to the Applicants' work in this area as reported in the Experimental Section of the present application, one of skill in the art would not have had a reasonable expectation of success in being able to successfully deposit a nucleic acid by a thermal inkjet such that the deposited nucleic acid would retain its ability to hybridize to its complement.

In support of this position, one need only look to U.S. Patent No. 5,658,802. This patent discloses that piezo inkjets are used to deposit nucleic acids on the surface of a substrate. However, the 5,658,802 patent states that with regard to thermal inkjet devices, "[t]hermal ink jets, however, are very stressful on the

dispensed fluid and the fluid must not be too aggressive to the heater element. Because of these constraints, thermal ink jets are generally unsuitable for dispensing applications other than those where the composition of the ink can be fully controlled." Col. 2, lines 14 to 19.

Thus, the prior art which taught the use of piezoelectric inkjet heads to deposit nucleic acids also teaches that thermal inkjet heads are not suitable for use in deposition of nucleic acids because of the stresses that are applied on the fluid during the deposition process. In view of this teaching of the prior art, one of skill in the art would at least expect a thermal inkjet device to disrupt the nucleic acid such that it was no longer able to hybridize to its complement following deposition. Therefore, prior to the Applicants' work as reported in the Experimental Section of the present application, one of skill in the art would not have had a reasonable expectation that one could successfully use a thermal inkjet device to deposit a nucleic acid where the deposited nucleic acid retained its ability to hybridize to its complement.

Deeg fails to address this lack of reasonable expectation of success in the prior art, as described above. Specifically, Deeg fails to provide any showing that an inkjet deposited nucleic acid is still capable of hybridizing to its complement because Deeg is only concerned with deposition of protein agents, e.g., enzymes and antibodies.

In view of the above amendments to the claims limiting the fluid to a nucleic acid containing fluid, it is submitted that the claims as amended are not anticipated by Deeg. Accordingly, the rejection of Claims 22, 23, 26, 31, 34, 37 & 38 under 35 U.S.C. § 102(e) as being anticipated by Deeg may be withdrawn.

Claims 22, 23, 26, 31, 34 & 37 have been rejected under 35 U.S.C. § 102(e) as being anticipated by Gamble.

As amended, Claims 22, 23, 26, 31, 34 & 37 are limited to methods of depositing nucleic acids. For the methods to work, e.g., in hybridization, the nucleic acids must be capable of hybridizing to their complement nucleic acids following deposition according to the subject methods.

For the reasons provided above, prior to the Applicants' work in this area as reported in the Experimental Section of the present application, one of skill in the art would not have had a reasonable expectation of success in being able to successfully deposit a nucleic acid by a thermal inkjet such that the deposited nucleic acid would retain its ability to hybridize to its complement.

Gamble fails to address this lack of reasonable expectation of success in the prior art, as described above. Specifically, Gamble fails to provide anyactual showing in the way of working exemplificaiton that an inkjet deposited nucleic acid is still capable of hybridizing to its complement. Without this actual showing, the above uncertainties with respect to the deposition of nucleic acids are not overcome by Gamble's disclosure.

It is well settled law that a reference must be enabling in order to anticipate a claim. The Federal Circuit has stated in In re Donahue, 226 USPQ 619 (Fed. Cir. 1985) that:

> It is well settled that prior art under 35 U.S.C. § 102 (b) must sufficiently describe the claimed invention to have placed the public in possession of it.7 In re Sasse, 629 F.2d 675, 681, 207 U.S.P.Q. (BNA) 107, 111 (CCPA 1980); In re Samour, 571 F.2d at 562, 197 U.S.P.Q. at 4; see also Reading & Bates Construction Co. v. Baker Energy Resources Corp., 748 F.2d 645, 651-52, 223 U.S.P.Q. (BNA) 1168, 1173 (Fed. Cir.1984). Such possession is effected if one of ordinary skill in the art could have combined the publication's description of the invention with his own knowledge to make the claimed invention. See In re LeGrice, 301 F.2d at 939,

> 133 U.S.P.Q. at 373-74. Accordingly, even if the claimed invention is disclosed in a printed publication, that disclosure will not suffice as prior art if it was not enabling. In re Borst, 52 C.C.P.A. 1398, 345 F.2d 851, 855, 145 U.S.P.Q. (BNA) 554, 557 (1965), cert. denied, 382 U.S. 973, 83 S. Ct. 537, 15 L. Ed. 2d 465 (1966).

Thus, if a reference is non-enabling for a particular invention, it cannot anticipate that particular invention.

Since Gamble is non-enabling for a method in which a thermal inkjet device is used to deposit a nucleic acid in a manner such that the nucleic acid retains its ability to hybridize to its complement, Gamble fails to anticipate the claimed invention. As such, Claims 22, 23, 26, 31, 34 and 37 are not anticipated by Gamble under 35 U.S.C. § 102(e) over and this rejection may be withdrawn.

In addition, Gamble provides a broad list of potential types of molecules that can potentially be deposited using Gambles device, where these potential types of molecules range from activated monomers to polymeric compounds, including polyamino acids. See Col. 4, lines 22 ff. However, as pointed out above, one of skill in the art would not have had a reasonable expectation of success in the deposition of a polynucleotide via the claimed methods, where the polynucleotide would retain its ability to hybridize to its complement. As such, the Applicants' work in this area amounts to unexpected results, which further demonstrates that the claimed invention is patentable over the Gamble reference.

Finally, the Examiner has rejected Claims 24, 25, 32, 33, 35, 36 & 39-43 as obvious under 35 U.S.C. § 103(a) over Gamble or Deeg in view of Cornell. As pointed out above, both Gamble and Deeg are deficient in failing to provide one of skill in the art with a reasonable expectation of success in being able to deposit a nucleic acid fluid with a thermal inkjet. As Cornell has been cited solely for the specific μJ element, Cornell fails to make up for this fundamental deficiency in the

cited primary references. Accordingly, Claims 24, 25, 32, 33, 35, 36 & 3943 are not obvious under 35 U.S.C. § 103(a) over Gamble or Deeg in view of Cornell and this rejection may be withdrawn.

Conclusion

The applicant respectfully submits that all of the claims are in condition for allowance, which action is requested. If the Examiner finds thata telephone conference would expedite the prosecution of this application, please telephone Gordon Stewart at 650 485 2386. The Commissioner is hereby authorized to charge any fees under 37 C.F.R. §§ 1.16 and 1.17 which may be required by this paper, or to credit any overpayment, to Deposit Account No. 50-1078.

Respectfully submitted,

Date: 12.27.01

By: _____
Bret E. Field
Registration No. 37,620

enc

- Terminal Disclaimer over U.S. Patent No. 6,221,653

VERSION WITH MARKINGS TO SHOW CHANGES MADE

In the specification:

Page 1, line 1 immediately beneath the title, please insert the following text:

--CROSS-REFERENCE TO RELATED APPLICATIONS

This application is a continuation of application serial no. 09/300,589 filed on April 27, 1999 and now issued as U.S. Patent No. 6,221,653; the disclosure of which is herein incorporated by reference.--

In the claims:

22. (Amended) A method for depositing a quantity of fluid containing a nucleic acid ~~or polypeptide~~, on a substrate surface having a plurality of binding agents stably associated therewith, said method comprising:

positioning a thermal inkjet head filled with said nucleic acid ~~or polypeptide~~ containing fluid in opposing relation to said substrate surface; and

actuating said thermal inkjet head in a manner sufficient to expel said quantity of fluid onto said substrate surface;

whereby said quantity of fluid is deposited on said substrate surface.

Cancel Claim 25.

31. (Amended) A method for introducing a nucleic acid fluid sample to a binding agent, said method comprising:

positioning a thermal inkjet head filled with said nucleic acid fluid sample in opposing relation to a surface of an array, wherein said array comprises a plurality of binding agents stably associated with said surface;

actuating said thermal inkjet head in a manner sufficient to expel a quantity of said fluid sample onto said array surface; and

allowing interaction between said fluid sample and said binding agent.

33. (Amended) The method according to Claim 31, wherein an energy pulse of between 1.5 to 15 μJ is supplied to the thermal inkjet head to expel the quantity of fluid ~~said biomolecule is a nucleic acid~~.

34. (Amended) A method for detecting the presence of a nucleic acid ~~or polypeptide~~ in a fluid sample containing said nucleic acid, said method comprising:

positioning a thermal inkjet head filled with said fluid sample in opposing relation to a surface of an array, wherein said array comprises a plurality of binding agents stably associated with said surface and at least one of said binding agents specifically ~~binds~~ hybridizes to said nucleic acid ~~or polypeptide~~;

actuating said thermal inkjet head in a manner sufficient to expel a quantity of said fluid sample onto said array surface; and

detecting the presence of any binding complexes between said at least one binding agent and said ~~analyte~~ nucleic acid on said array surface;

whereby the presence of said analyte in said fluid sample is detected.

36. (Amended) The method according to Claim 35, wherein between an energy pulse of 1.5 to 15 μJ is supplied to the thermal inkjet head to expel the quantity of fluid ~~said analyte is a nucleic acid~~.